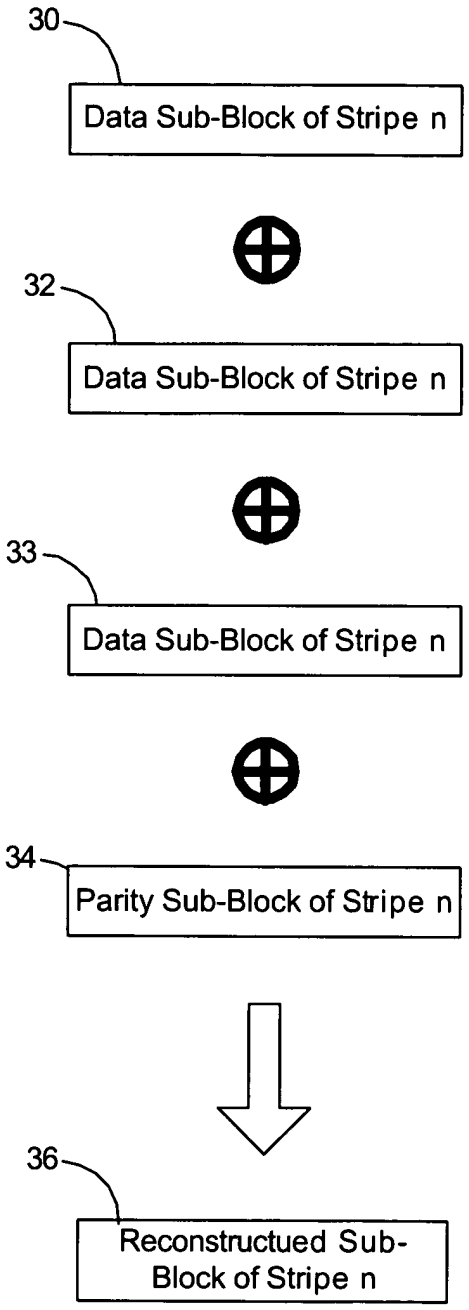


FIG. 1
Prior Art

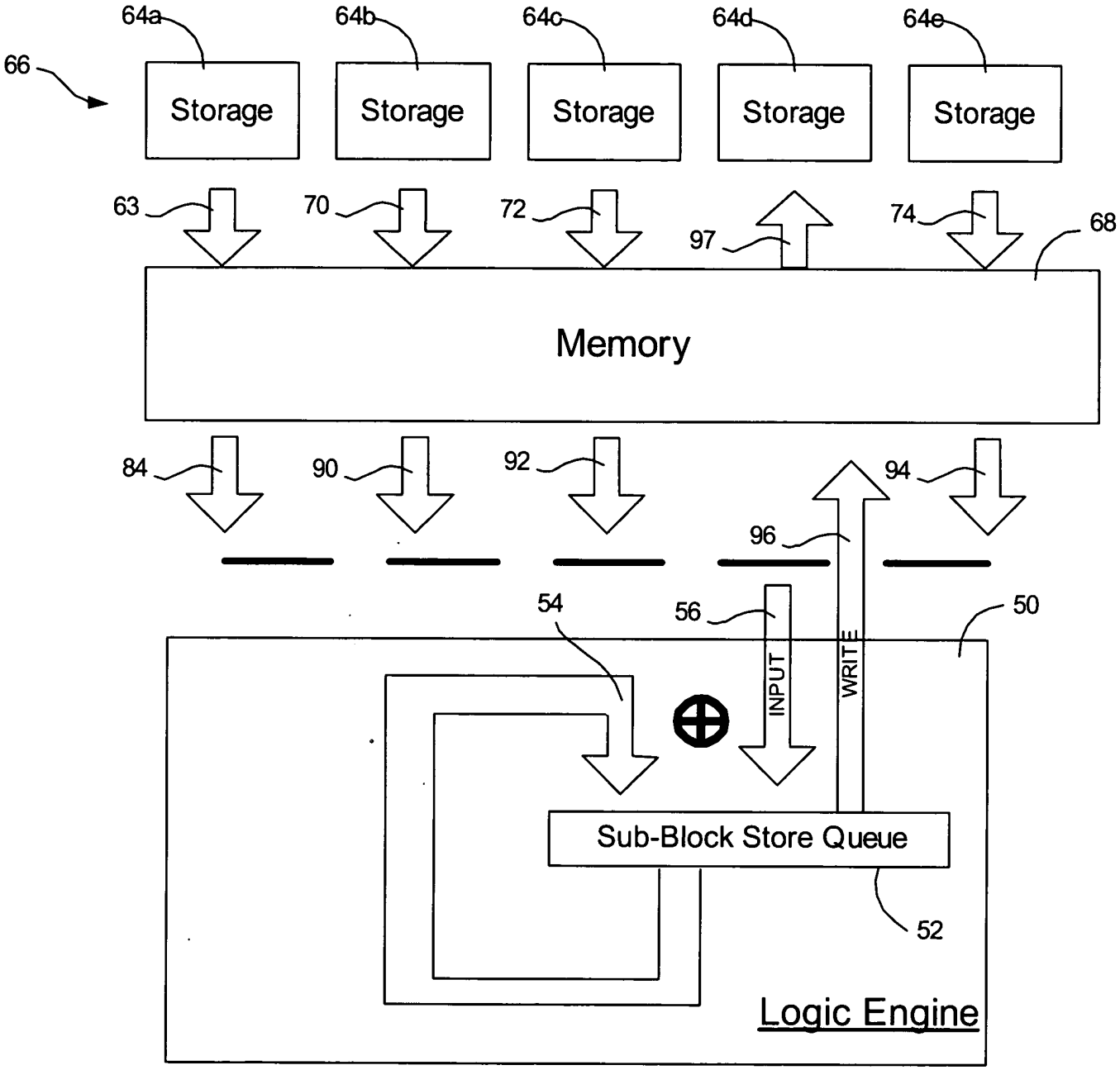


FIG. 2
Prior Art

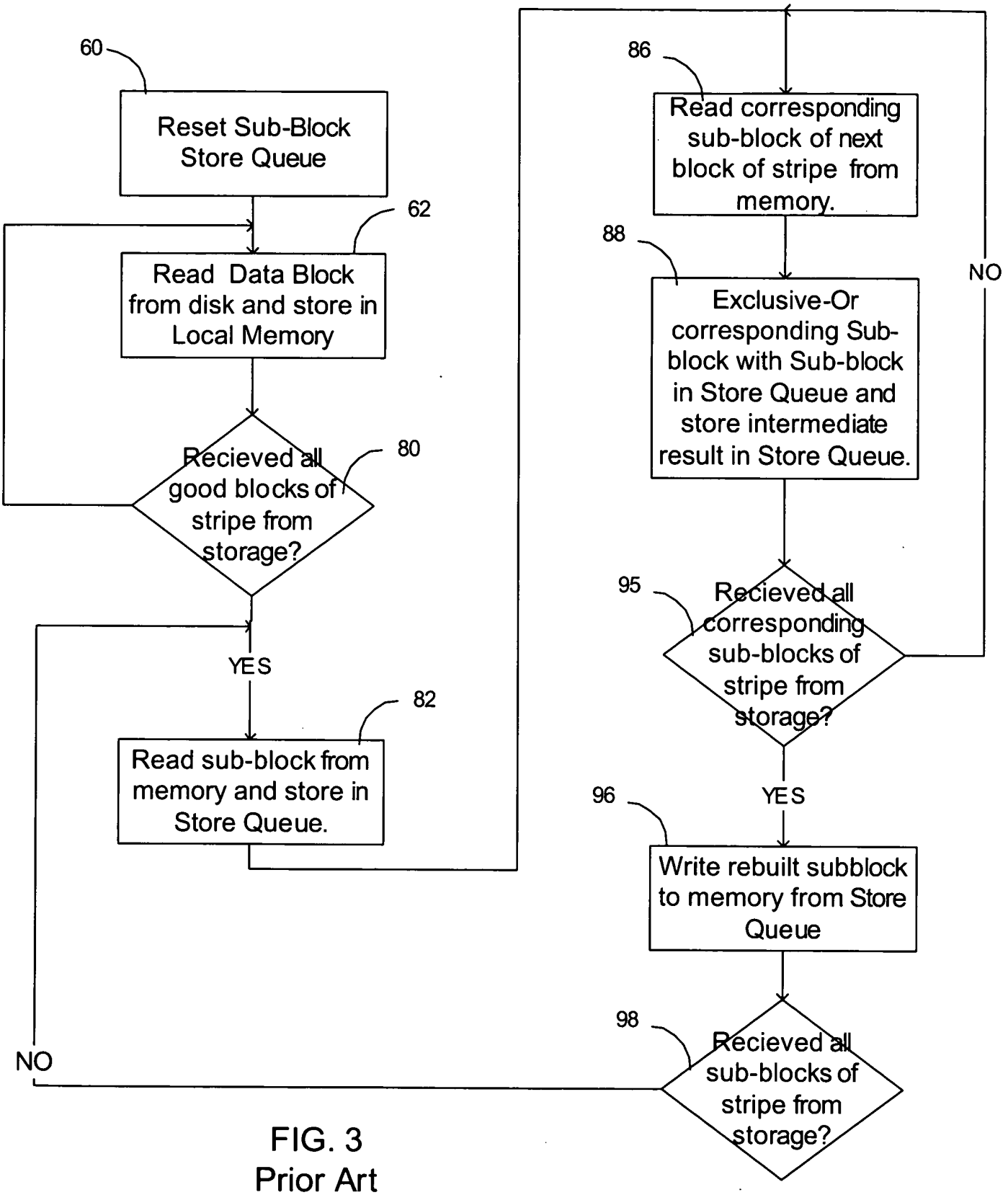


FIG. 3
Prior Art

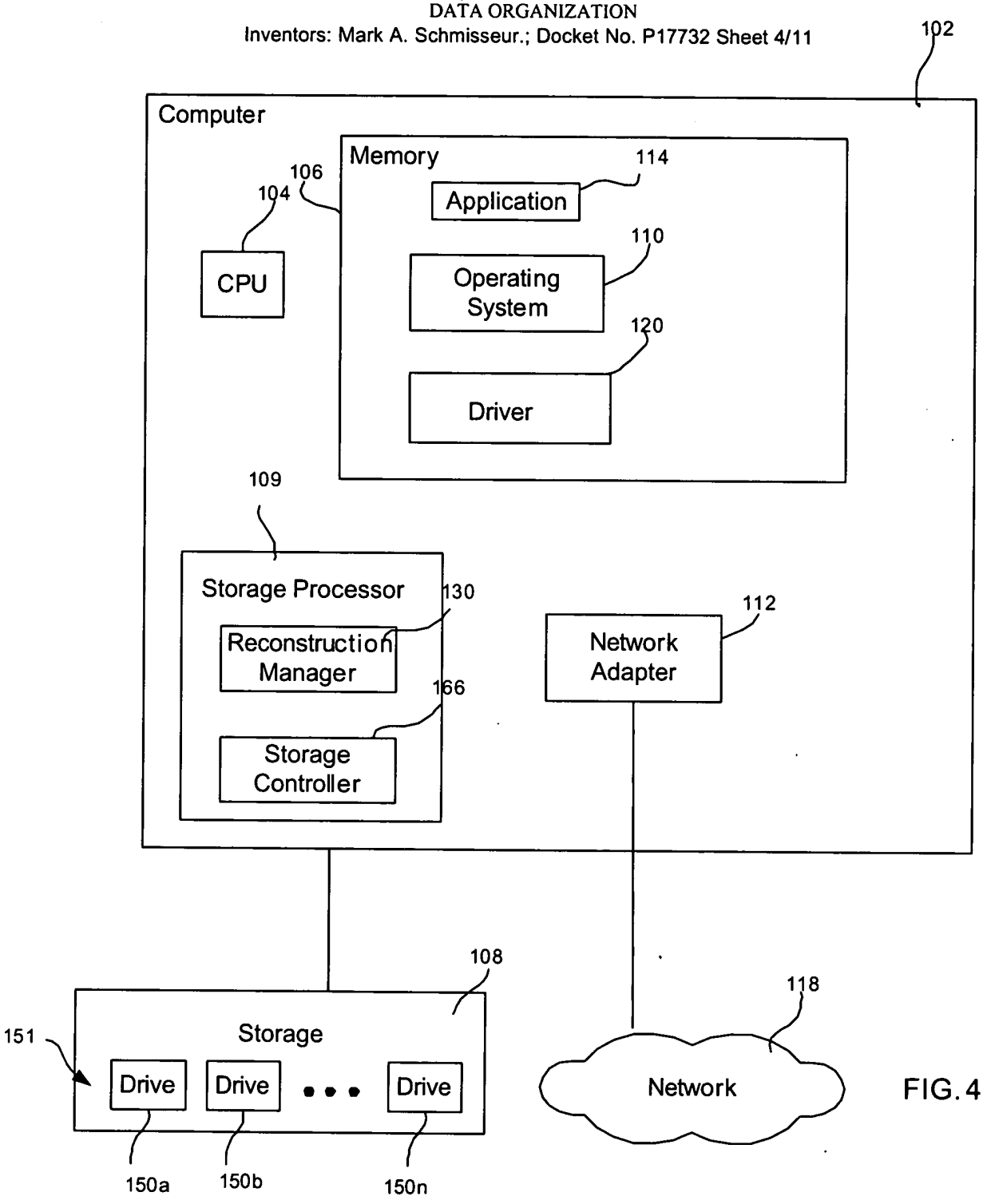

102
Computer
Memory
114
Application
106
104
CPU
110
Operating System
120
Driver
109
Storage Processor
130
Reconstruction Manager
166
Storage Controller
112
Network Adapter
108
151
Storage
Drive
Drive
Drive
118
Network
150a
150b
150n

FIG. 4

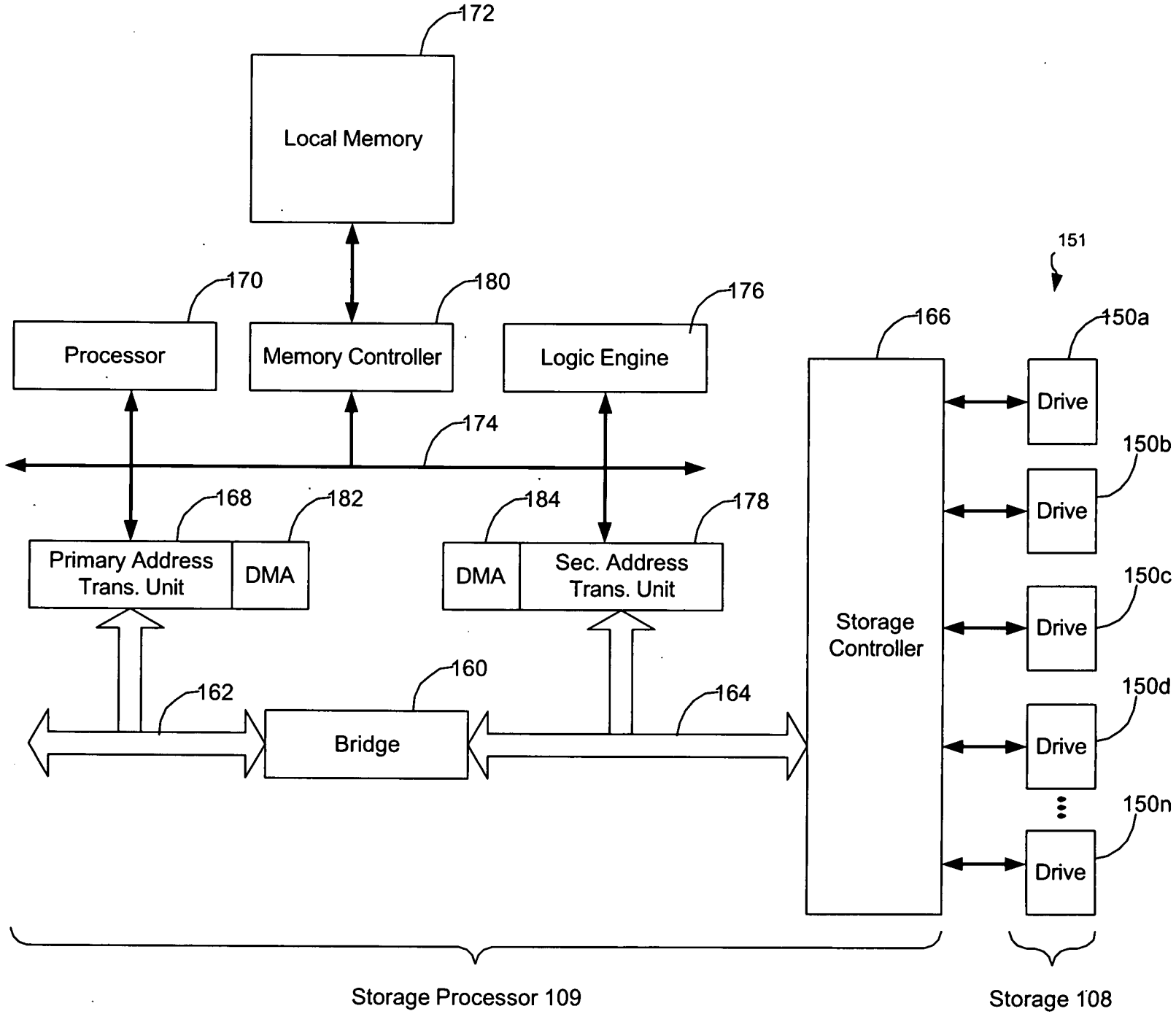

172
Local Memory
170
180
176
Processor
Memory Controller
Logic Engine
174
168
182
184
178
Primary Address Trans. Unit
DMA
DMA
Sec. Address Trans. Unit
162
160
164
Bridge
151
166
150a
Storage Controller
Drive
150b
Drive
150c
Drive
150d
Drive
150n
Drive
Storage Processor 109
Storage 108

FIG. 5

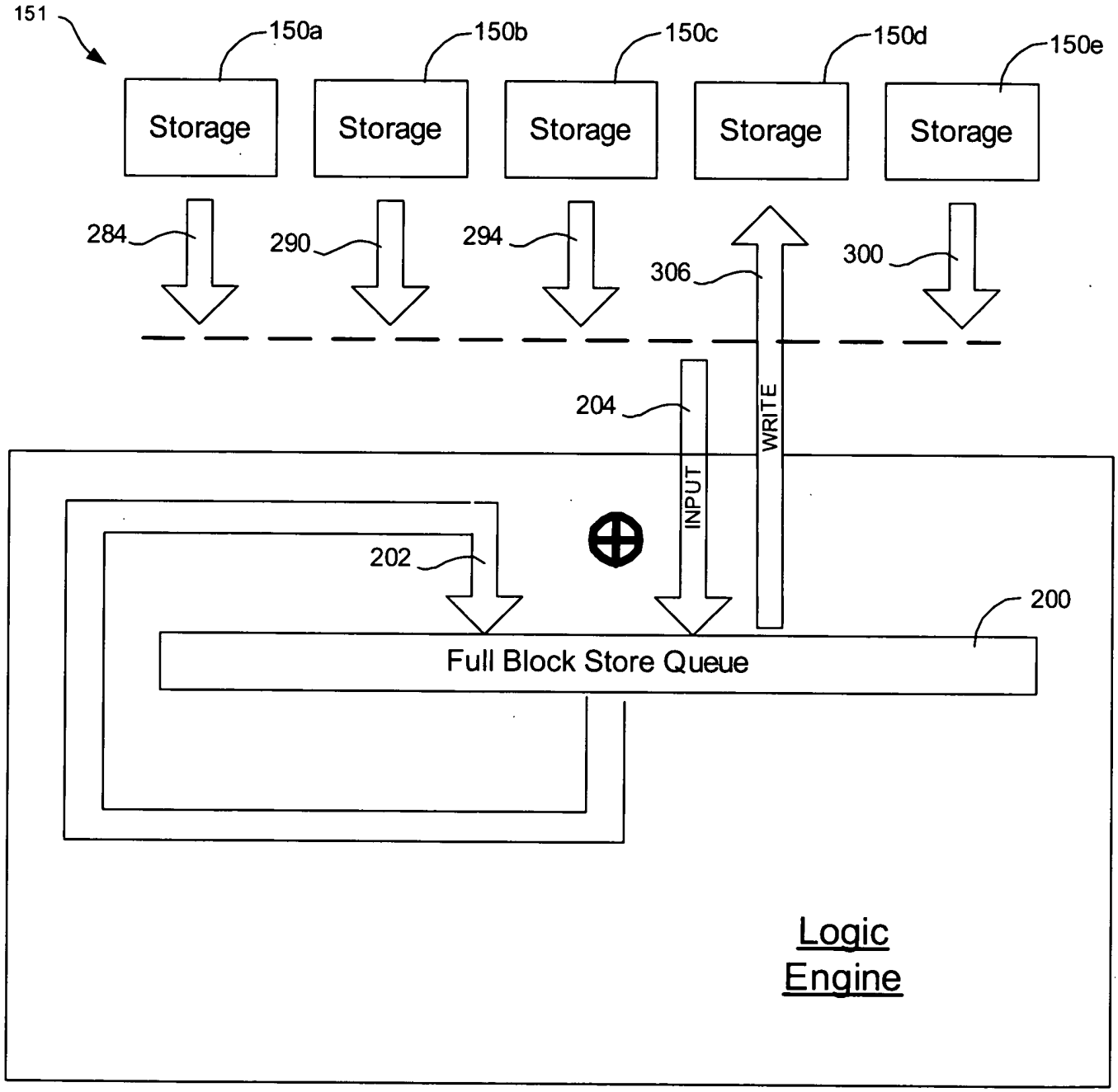

151
150a
150b
150c
150d
150e
Storage
Storage
Storage
Storage
Storage
284
290
294
306
300
204
WRITE
INPUT
202
200
Full Block Store Queue
Logic
Engine

FIG. 6

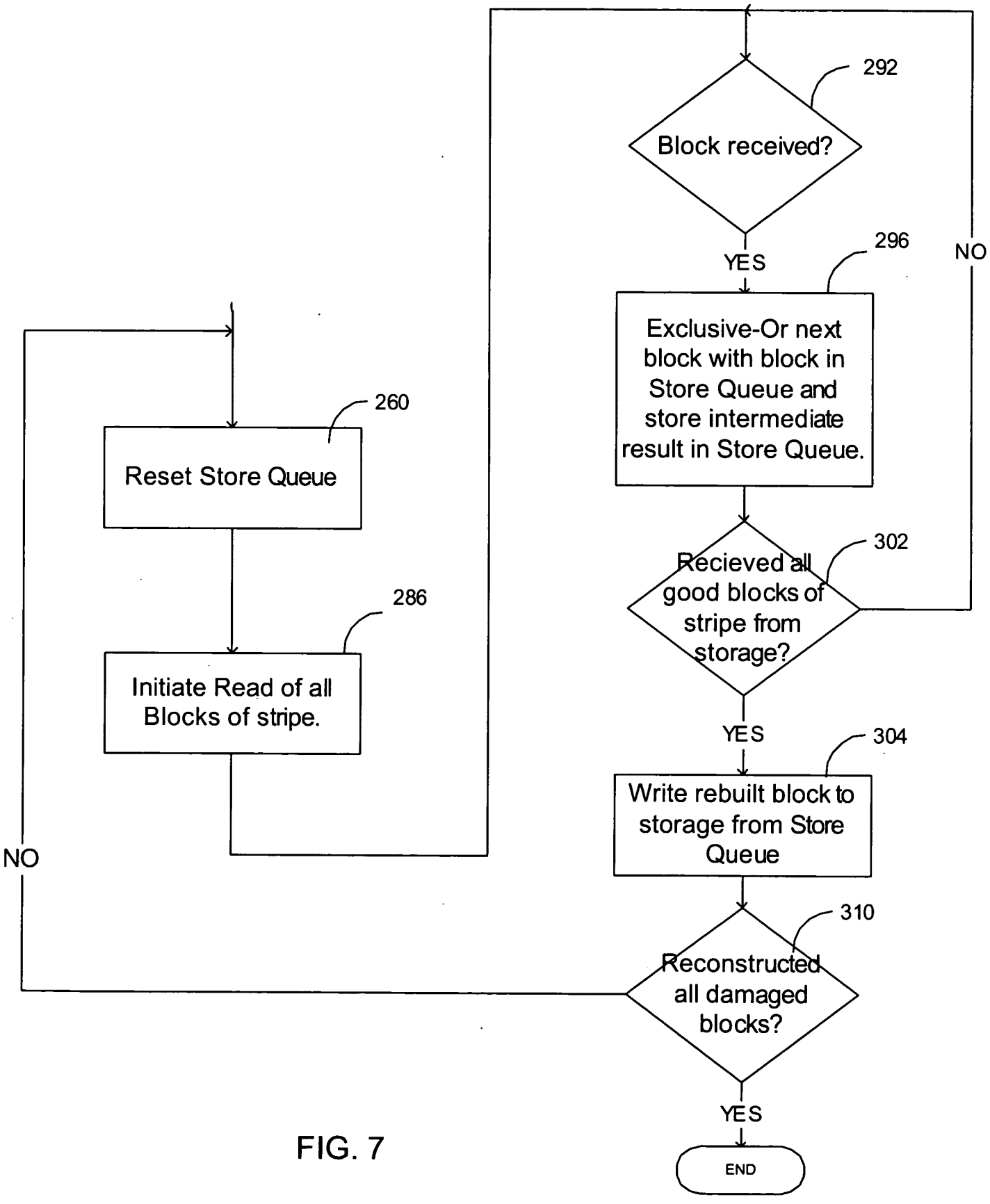

292
Block received?
YES
NO
296
Exclusive-Or next block with block in Store Queue and store intermediate result in Store Queue.
302
Recieved all good blocks of stripe from storage?
YES
NO
304
Write rebuilt block to storage from Store Queue
310
Reconstructed all damaged blocks?
YES
END
260
Reset Store Queue
286
Initiate Read of all Blocks of stripe.

FIG. 7

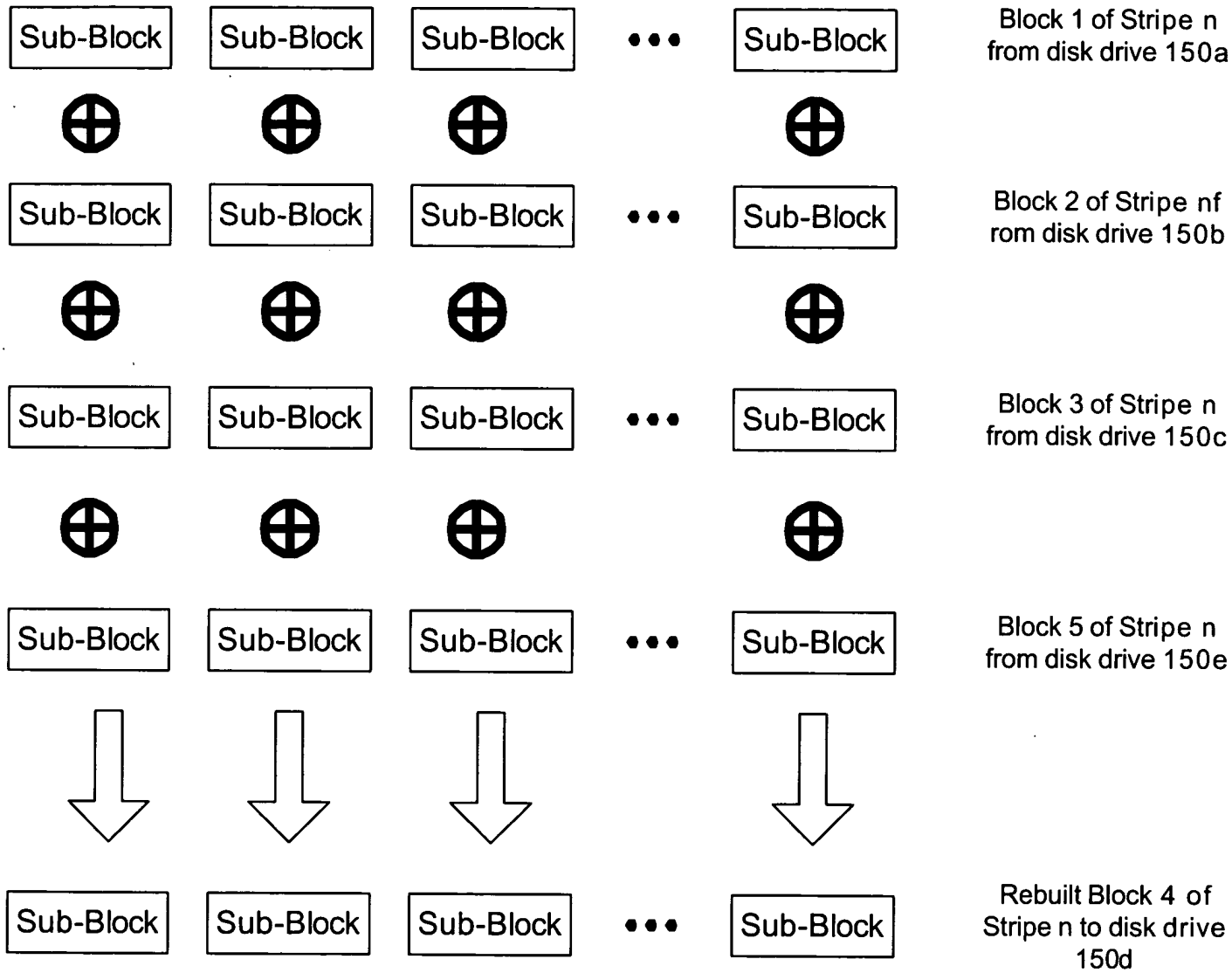

Sub-Block
Sub-Block
Sub-Block
Sub-Block
Block 1 of Stripe n from disk drive 150a
Sub-Block
Sub-Block
Sub-Block
Sub-Block
Block 2 of Stripe nf rom disk drive 150b
Sub-Block
Sub-Block
Sub-Block
Sub-Block
Block 3 of Stripe n from disk drive 150c
Sub-Block
Sub-Block
Sub-Block
Sub-Block
Block 5 of Stripe n from disk drive 150e
Sub-Block
Sub-Block
Sub-Block
Sub-Block
Rebuilt Block 4 of Stripe n to disk drive 150d

FIG. 8

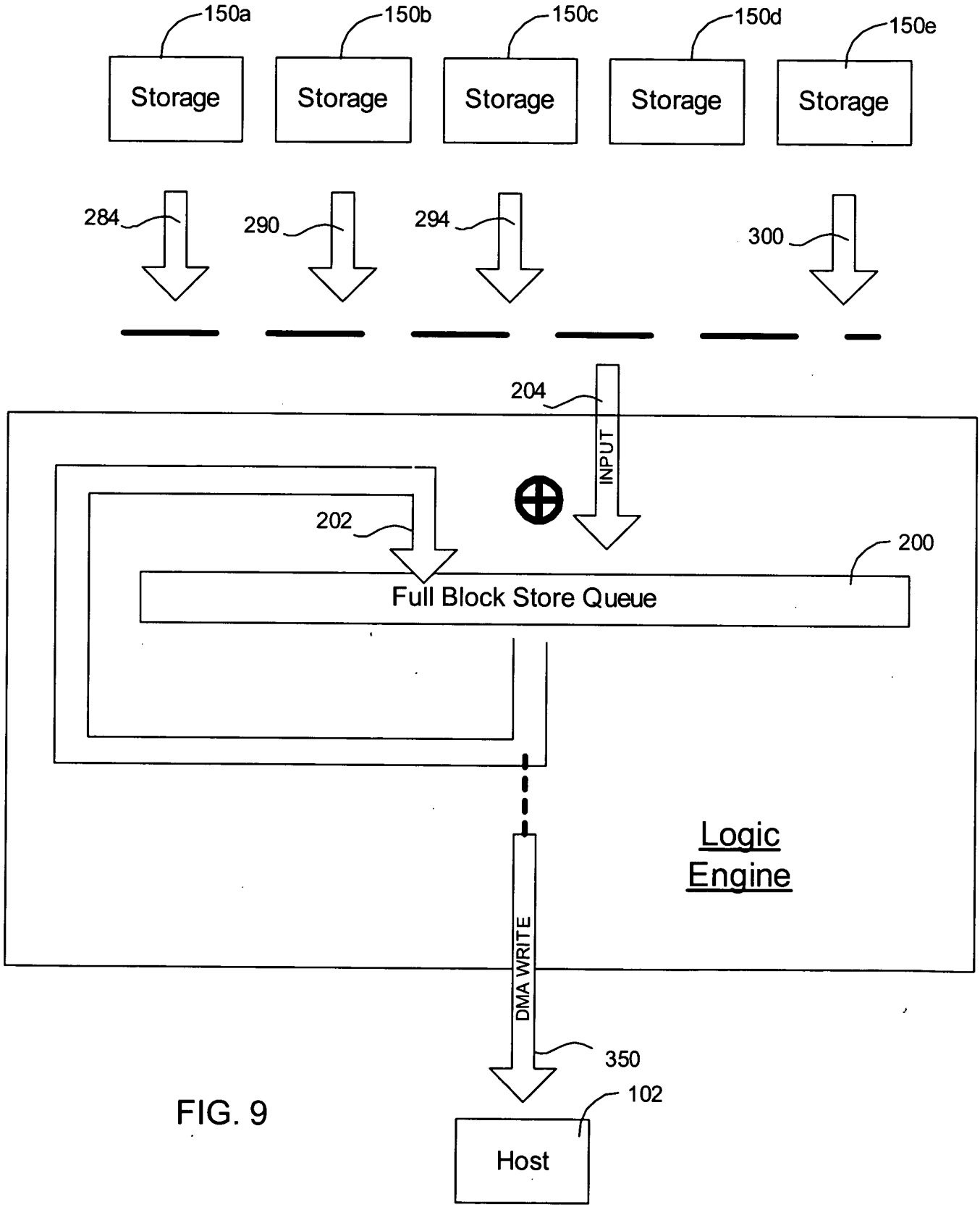

150a
150b
150c
150d
150e
Storage
Storage
Storage
Storage
Storage
284
290
294
300
204
INPUT
202
200
Full Block Store Queue
Logic
Engine
DMA WRITE
350
102
Host

FIG. 9

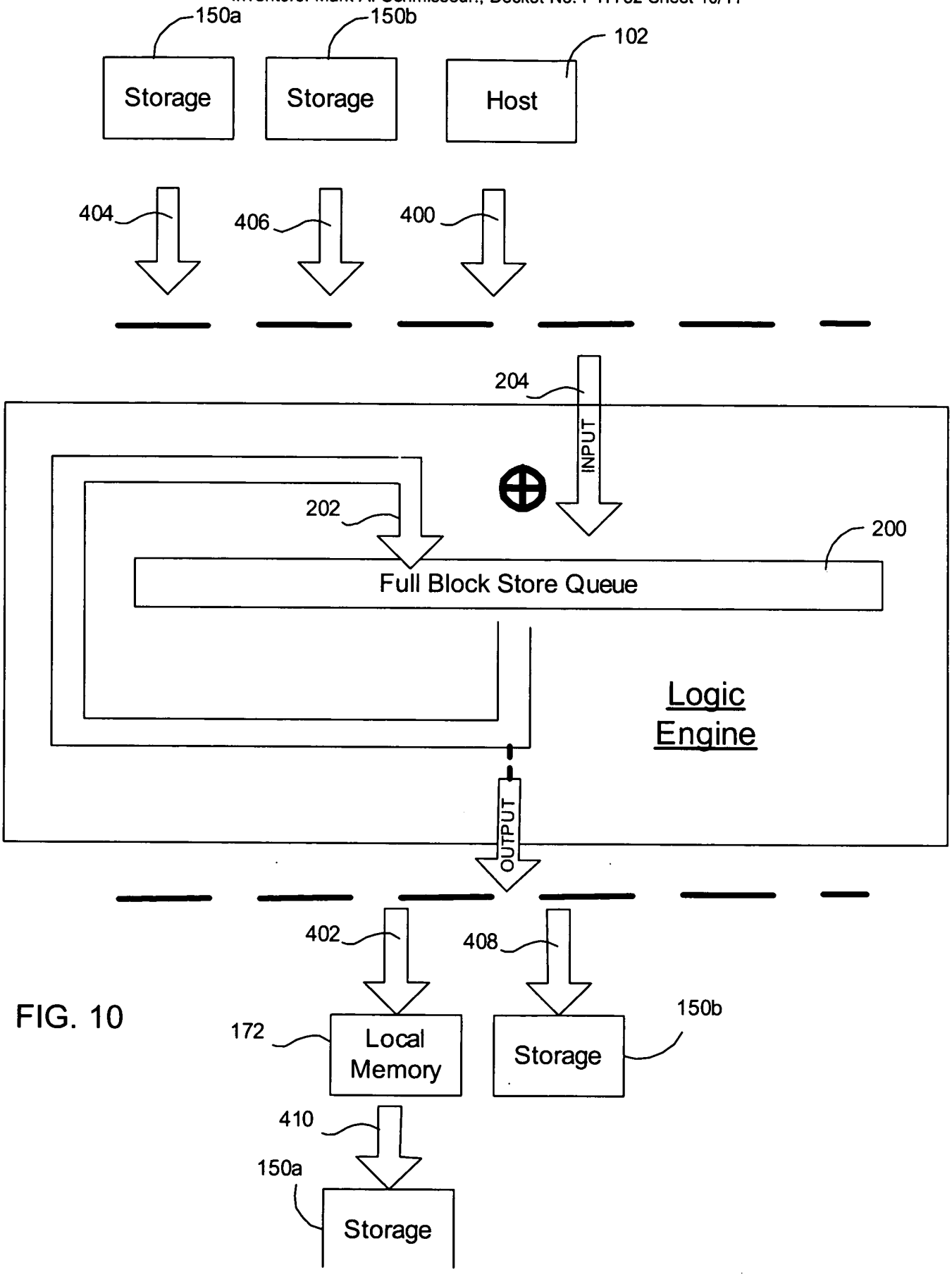
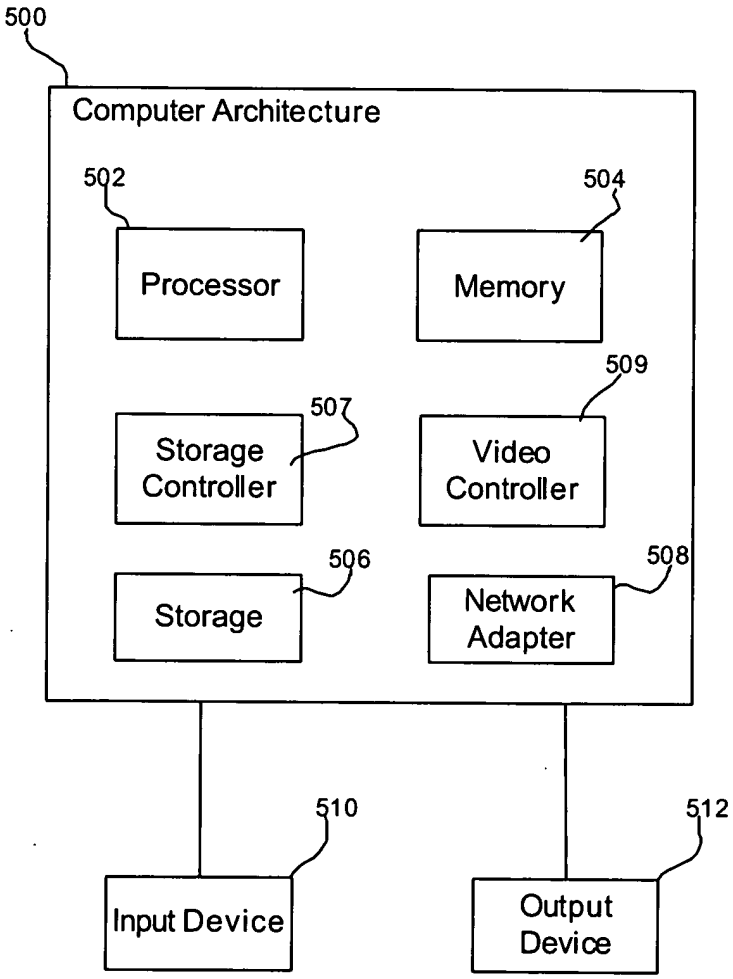

150a
150b
102
Storage
Storage
Host
404
406
400
204
INPUT
202
200
Full Block Store Queue
Logic
Engine
OUTPUT
402
408
172
Local
Memory
Storage
150b
410
150a
Storage

FIG. 10

FIG. 11


500
Computer Architecture
502
Processor
504
Memory
509
507
Storage Controller
Video Controller
506
508
Storage
Network Adapter
510
512
Input Device
Output Device